how he breathes in the dress, and although I see how it could be effected, I think it right to leave it to Mr. Fleuss himself to describe the principle of his invention whenever he thinks, from his experiments, the fitting time has arrived.

In whatever way Mr. Fleuss gets breathing-room under the water, he has, without a doubt, achieved a great practical success. He has learned how to live independently for a long time shut off from all external access of air. He has learned, if I may so say, to become artificially amphibious, and if his plan succeeds, the cumbrous diving-pumps are done away with and the art of diving is vastly simplified.

Again, if he can live so long on the small reserve which he carries down with him in his dress, he has only to enlarge the dress, to expand it, that is to say, into a submerged vessel, to be able to go anywhere under the sea and do with intelligence what is now left to unintelligent mechanism. What such an intelligent direction might do with torpedoes it is not at all pleasant to contemplate.

The plan may be used for the purposes of deep-sea exploration, and the suggestion I made respecting my Salutlanders, that they sought for discoveries on the floors of the great oceans, may be so much nearer to accomplishment than the time which I assigned to it, that I may haply live to have the return laugh at what was called "the most visionary of speculative fancies." It is equally probable that the aëronaut may be able to rise much higher than he has yet done in this dress, or in a car specially constructed on a similar plan.

The apparatus may almost certainly be applied at once to another service very different in kind and on land instead of water. When a man can move about with an air-supply in his pockets, so to speak, he can go into fire as well as water. In a fire-proof non-conducting dress, provided with Fleuss's breathing apparatus, a fireman could enter a burning house, and without danger of suffocation go wherever the weight of his body could be borne.

Lastly, in wells charged with foul air, or in mines charged with choke-damp and other poisonous gases, the Fleuss apparatus will, I feel certain, prove of the greatest practical service, and I am happy in being the means of introducing it at length to the notice of my *confrères* in science.

BENJAMIN WARD RICHARDSON

NEW GUINEA[1]

BEFORE us lies one of the earliest published maps in which New Guinea is laid down. It belongs to Huygen van Linschoten's book of East Indian voyages, and was published in the year 1595, being derived largely from Portuguese sources. The map is turned on one side as compared with our present ones, so that at the top, on one hand, appears Japan, strangely shaped, and with the names of the cities curiously spelled, Meacum (the capital, Miaco, Kioto) and Tochis (Tokio?): whilst on the other hand lies New Guinea. At the foot of the map are Sumatra and the Bay of Bengal, and on the left hand China stands prominently upwards from the base of the map, with a camelopard walking about in its midst, regardless of the rules of geographical distribution. The north point lies to the left hand of the map, and the south to the right. New Guinea is represented as a very large and elongate island, the south coast being drawn without definite outline as unexplored, but with the Aru Islands duly shown lying off it. The great island is marked "Os Papvas," and at its eastern corner is the inscription "Hic hibernavit Georgius de Menezes." Although Antonio d'Abreu and Francisco Serraõ possibly sighted the New Guinea coast in 1511, Dom Jorge de Menezes must be regarded as the actual discoverer of the island. He was driven by the prevailing monsoon out of his course far to the eastward, when attempting to reach the Moluccas, from Malacca, by a new route round the north of Borneo in August, 1526. Having thus reached an island lying off the coast of Papua, he had to "winter" there, that is to say, to wait for the periodical change of the monsoon. According to Oscar Peschel, the island at which he remained, and which was called Versija, was very possibly one of those lying off Geelvink Bay. It is remarkable how very slowly our knowledge concerning New Guinea grew through the explorations of successive voyagers, since the time of Menezes until within the period of the last ten years, and even now it is quite startling to pick up a small octavo volume and find it jauntily entitled "A Few Months in New Guinea," as if New Guinea were as familiar and accessible a place as say Iceland or Norway, about which such little books are commonly written by enthusiastic tourists.

We are sorry, indeed, that Mr. Stone's book is so little, and would have been glad if it had been three times as long, and he had given us further details of all kinds concerning his most interesting sojourn amongst the Motu people of the coast, whose God dwells out over the sea, and the mountain-dwelling Koiaris, who believe the dread "Vata" inhabits the mountain summits.

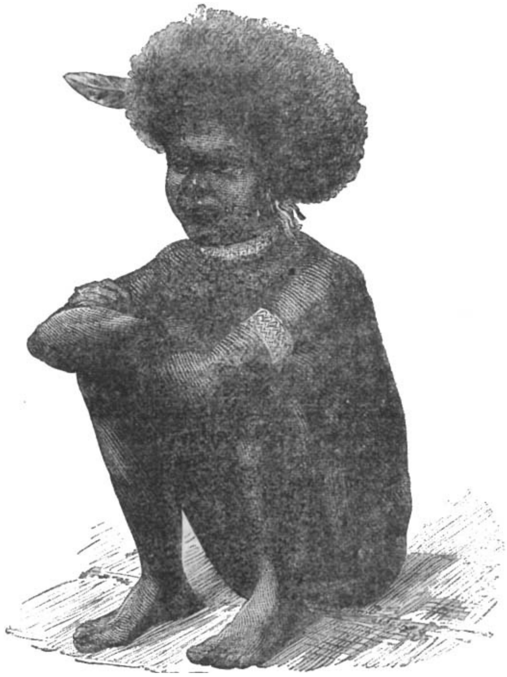

FIG. 1.—Vahu, a Motu youth.

It is close to the east end of New Guinea, and on its southern shore beneath the Owen Stanley range of mountains that the Motu country lies. Mr. Stone first made an excursion from Cape York, in the small mission steamer *Ellengowan*, up the Maikasa or Baxter River, the mouth of which, on the New Guinea coast, lies due north of the Cape, just on the opposite side of Torres Straits. The river was traversed for sixty-four miles, but then forked, and since both channels were too narrow for the steamer to turn in, further progress was stopped. At this distance even from the river's mouth, native plantations of yams, sugar-cane, and tobacco were found. A further distance of twenty-six miles was traversed in a small boat, and large numbers of the recently-discovered species of Bird of Paradise, *Paradisea raggiana*, were met with. The bird does not croak like the Great Bird of Paradise of the Aru Islands, "wauk wauk," but utters "a peculiar whistle resembling that of a man to his dog," and must thus in its note come very near its more distant ally, the Rifle Bird of Cape York and New Guinea (Ptilorhis). As the small boat returned to the steamer it was greeted by the sweet strains of a "barrel-organ," brought in the hope that it "might please some of the natives." It is really appalling to realise that a "barrel-organ" has penetrated sixty-four miles up a river in New Guinea; and though we heartily wish the organs and their grinders were all in New Guinea, yet, did we regard matters from a missionary and philanthropical point of view, we should have thought twice before attempting to demoralise the musical ears of the poor Papuans with such an instrument; or, perhaps, knowing the high ability of the Papuan race, we should have expected such a course to evoke hostility rather than to conciliate. But the missionary charm did not work; the natives kept well away from the barrel-organ: only one was sighted, and he promptly fled.

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[1] "A Few Months in New Guinea." By Octavius C. Stone, F.R.G.S. (London: Sampson Low and Co., 1880.)

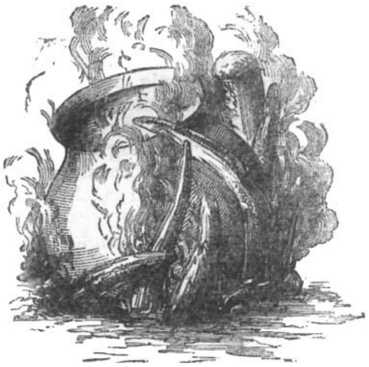

FIG. 2.—Burning pottery in Anuapata.

After a return to Cape York, Mr. Stone, with three assistant natural history collectors, Messrs. Hargrave, Petterd, and Broadbent, proceeded again to New Guinea in the *Ellengowan;* and after touching on the way at Roro or Yule Island, where the natives cultivate fields of from five to thirty acres in extent, inclosed by fences six feet high; and at Purok on the main land, where the natives have a large circular market place cleared of grass and trees, and periodically used by surrounding tribes, arrived at Anuapata (Port Moresby) amongst the Motu people on October 29, 1875. The arrival of the white men was not greeted with pleasure by the natives, because many of them had lately died of the measles introduced by the missionaries. The party at once erected their tent, and, proud of their nationality, and apparently taking a leaf out of Mr. Stanley's book, hoisted a union-jack at each end of the roof, and on a pole in front a banner with "Excelsior" upon it, thus apparently intimating that they intended to climb the neighbouring mountains if they could. They were soon beset by the natives, whose constant cry, corresponding to that of "bacshish," or the Fuegian "yammerschooner," is "kuku lasi"—"Won't you give me some tobacco?" The Motu people have an insatiable appetite for *trade* tobacco. In the evening there was a tremendous hubbub round the tent, and a hostile demonstration caused partly by a Polynesian Christian teacher, who, left in charge of the tent, had pointed a gun at would-be intruders, but also partly because the natives were not pleased at the white men persisting in remaining in their country contrary to their wish, and very naturally so, after the experience of the measles. But the natives were luckily afraid of the dark, and were frightened into submission by a display of rockets and of the power of dynamite. As a sort of set-off for thus frightening them almost out of their lives, great care was taken that they should not be corrupted by Sunday trading.

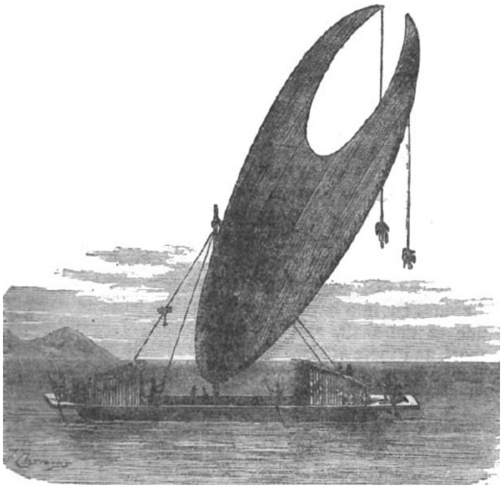

FIG. 3.—Trading canoe or lakatoi.

The natives have dogs which, like the Australian dingo, do not bark. The author wishes he had had a bulldog with him, for he describes the natives as "expert thieves, inveterate liars, and confirmed beggars," and feels sure that a dog which could bark would frighten them out of their wits. They ran away from a sheep landed from the *Ellengowan.* They have strict commercial instincts, and would "see you starve before they gave you food." Everything has to be bought with "trade gear." The natives are not cannibals, but were evidently acquainted with cannibalism, for, being firmly persuaded that all the tinned meats consumed by the white men consisted of human flesh, they expressed great disgust at the cannibal practices of their visitors. It is delightful to find the Papuan thus turning the tables on the pioneers of civilisation.

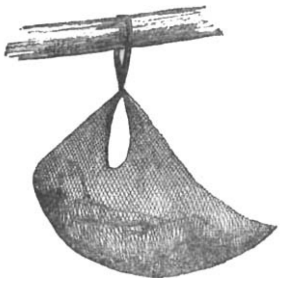

FIG. 4.—Native cradle.

The Motu people seem on the whole very much bored by the presence of the missionaries, excepting when a chapel is formally opened, and there is a big feast in consequence. As they cannot dispose of their teachers in the usual way, perhaps in secret they pray for help to the cassowaries of which the author saw the foot-prints in the neighbourhood, for these voracious birds are, as the naturalist knows, far more at home in New Guinea than at Timbuctoo; but possibly even New Guinea cassowaries would require the traditional condiment, and matters have not as yet reached the hymn-book stage in Papua. A very amusing account is given of a missionary religious service at Anuapata. It appears that there are bold and contumacious sceptics amongst the Motu people who refuse to assimilate the Jewish cosmogony, and do not mind expressing their opinions freely in public.

"The service was held beneath a roof thatched with grass, supported on posts, open on each side, and fitted at one end with a low stage and reading-desk. Previously to the present occasion not more than two or three natives had ever attended, but, attracted, no doubt, more by curiosity than by any religious feeling, no less than three hundred, including men, women, and children, were now present, three-fourths of whom were compelled from want of space to remain outside. They appeared to know they ought to be quiet, and some of the eldest seemed to be listening, but the greater part were looking around them and evidently inattentive, apparently taking no interest in the proceedings. The small boys amused themselves by flinging pebbles at one another, making grimaces, or pulling a stray dog's tail, and sometimes the word koi-koi, meaning 'lie,' would be heard in reference to something the missionary was saying."

The Motu people express surprise in a curious and interesting way, namely, by drawing in their lower jaw and clicking their upper teeth with the thumb-nail of the right hand, very much the same gesture as the old European "biting of the thumb." They also express surprise by smacking their lips. The women are expert makers of pottery. The clay is worked into shape by hand over an earthenware mould, of course without any wheel appliance. The upper and lower halves of a vessel are made separately and afterwards joined. The pots are baked in an open fire on the sea-beach. They are of a brick-red colour when baked, and are made of three forms—the "ura," or cooking-pot, the "hordu," or water-pitcher, and the "nao," or bowl.

The natives start in every November with large cargoes of this pottery on a trading expedition a distance of two hundred miles up the coast; three or four of the largest canoes are lashed firmly side by side with rattans, and the compound craft thus produced is termed a lakatoi; some of these lakatois are propelled by a dozen square sails and others by a single huge elliptic-shaped sail, which is extremely picturesque in appearance, but the cause of the peculiar form of which seems very uncertain.

In return for the pottery the natives receive sago, yams, taro, sweet potatoes, betel-nuts, and sugar-cane. The record of the undertaking of systematic long voyages, such as these by savages, is a very valuable fact, and helps to account for a rapid spread of cultivated plants, such as tobacco, for example, which doubtless originally reached New Guinea from America through Europeans. Whilst waiting for a start at Anuapata, the crews of the six lakatois from the neighbouring villages, composing the trading fleet, held regattas almost every day to while away the time and get into training. A terrible wailing was made by the womenkind on the day of actual departure, and many embraces between husbands and wives took place upon the beach, and there was much rubbing of noses; the women escorted the lakatois some distance in single canoes.

The mothers rock their babies by swinging them in a net bag suspended from a beam beneath the verandah, and the babies are often carried in these bags.

We cannot follow the author further in his account of the Motus, nor cite any of his interesting experiences amongst the Koiaris. The book is well illustrated throughout, and at the end is a short Motu dictionary, and shorter tables of eight other Papuan languages. The Motu people have a name for every different plant and bird, and for all the conspicuous stars. Numerals are given up to a million. We should almost be inclined to doubt the Motu conception of so high a number; possibly there may be some mistake in the matter. In the Koitapu language the numerals for eight and nine appear to be formed by subtraction from ten, and to mean (ten) less two and (ten) less one, as in the Admiralty Island language. The personal names for women are amusing indeed, the first two are probably intended as complimentary, but the remaining three can hardly have such a meaning; those cited by the author, when translated, mean "pig," "thief," "hungry," "frightened," and "bad."

A list of birds drawn up from the author's important collection by Mr. Bowdler Sharpe closes the book. The author seems to have little or no knowledge of natural history, since he repeatedly speaks of a Dugong as "a large *fish*," and further describes it as a "finny monster," and he imagines that the pig was introduced into New Guinea by Capt. Cook. His descriptions of birds, insects, and other animals seen are, however, interesting throughout the book. He gives some valuable information about the pigs. Some are kept tame by the natives, and some of them are very fine and fat; when young they are striped longitudinally, yellow, brown, and black, every other stripe being black; the stripes blend to a general dark brown tint as the animals get older. It is interesting to find that the Papuan pig exhibits the same markings as the European young wild boar so plainly. The natives have an ingenious way of catching the wild boar. When the boar charges, after being slightly wounded with a spear, a net with a very wide mesh set on a hoop-like frame is pushed over his head as he rushes forward. He gets his neck into one of the meshes, and with the large hoop about his throat, is helpless, and then easily killed.

We commend Mr. Octavius Stone's book to all classes of readers: there is not a dull page in it.

VERTICAL SHAFTS IN THE CHALK IN KENT

THE deep caves in the chalk in Kent while preserving a general form in a limited area, present certain differences amongst themselves, which enable us to trace something of their history as to time and object.

Those now most easily examined are the latest and best constructed. Though they are not dug at the present day here, there are many old ones that have been worked for chalk. These are distinguished by their irregular shapes and very wide shafts.

But there are fine examples now open of which North Kent has many having these general characters—a deep shaft, penetrating the soils (Woolwich pebble beds, Thanet sands and gravels) above the chalk, then the chalk itself from 2 to 5 feet, and widening out into a cave in the latter, mostly without effort at burrowing laterally, and when doing so keeping the shaft in the middle and the general shape of the cave as it were one area, with a due regard for the permanence of the roof. Some had pillars for this purpose left in the chalk, and there is one with four of them which are elegant in form and rounded. This cave being an excellent example of the kind, may be more particularly described. The shaft is 3 feet 3 inches in diameter (a common average), and passing through sand reaches the chalk at 51 feet; then penetrating it 2 feet widens out into an area of 49 × 38 feet, the sides cut into bays. Two pillars are left, one on each side of the shaft, and in continuation of it, still 3 feet apart, and there are two other pillars in the eastern part. The western part having no pillars has fallen in, and there is a large mound of sand and rubbish in the centre—but the height of the cave is 20 feet, perhaps 22 feet.

In this case the access to the chamber is perfect: the shaft is provided with foot-holes from 6 inches to 20 inches (occasionally) in lateral depth; these pass from the surface to the bottom of the central pillars at about 18 inches apart and opposite to each other, and it was easy a few years ago to descend and ascend without assistance, unless perhaps with that of a stick across the mouth of the shaft. Some of the shafts have foot-holes only to the point where they widen out below, when recourse was had to a pole or rope, of course.

Most of the caves are simpler than this, and the commonest form is a mere beehive sort of widening.

All these open caves appear to have been dug with iron picks.

At Greenhithe one has been lately found containing a